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IS 10632-1 (1983): Non Magnetic stainless steels for electrical applications, Part 1: General requirements [MTD 16: Alloy Steels and Forgings]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

SPECIFICATION FOR
NON-MAGNETIC STAINLESS STEELS FOR
ELECTRICAL APPLICATIONS
PART 1 GENERAL REQUIREMENTS

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*Indian Standard*SPECIFICATION FOR
NON-MAGNETIC STAINLESS STEELS FOR
ELECTRICAL APPLICATIONS

PART 1 GENERAL REQUIREMENTS

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Indian Standard

SPECIFICATION FOR NON-MAGNETIC STAINLESS STEELS FOR ELECTRICAL APPLICATIONS

PART 1 GENERAL REQUIREMENTS

0. FOREWORD

0.1 This Indian Standard (Part 1) was adopted by the Indian Standards Institution on 30 August 1983, after the draft finalized by the Alloy Steels and Special Steels Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard has been prepared with a view to guiding the industry with regard to manufacture and use of non-magnetic stainless steel wires, sheets, strips and plates for electrical applications.

0.3 For the benefit of the purchaser, an informative appendix (*see* Appendix A) giving particulars to be specified while ordering for the steel has been included.

0.4 This standard is being published in three parts, as given below:

Part 1 General requirements

Part 2 Specific requirements for binding wires

Part 3 Specific requirements for sheets, strips and plates for electrical applications.

0.5 This standard keeps in view the manufacturing and trade practices followed in the country in this field. In the formulation of this standard assistance has been derived from JIS — C 2507-1977 'Tin coated non-magnetic steel wire for armature binding' issued by Japanese Industrial Standards Committee.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part 1) covers the general requirements of non-magnetic stainless steel in the form of wires, flattened wires, sheets, strips and plates used in electrical machines as armature binding wires and parts that shall not disturb a magnetic field.

1.2 The specific requirements for wires, and sheet, strips and plates are given in IS : 10632 (Part 2)-1983* and IS : 10632 (Part 3)-1983*, respectively.

1.3 This standard does not apply to wires, wire rods, etc, of general purpose stainless steel grades.

2. TERMINOLOGY

2.1 For the purpose of this standard the definitions given in IS : 1956 (Part 3)-1975†, IS : 1956 (Part 4)-1975† and IS : 1956 (Part 5)-1975† shall apply.

3. SUPPLY OF MATERIAL

3.1 General requirements relating to the supply of material shall be laid down in IS : 1387-1967‡.

4. MANUFACTURE

4.1 Steels shall be made by electric melting process.

5. GRADES

5.1 This standard covers the following grades of non-magnetic stainless steels:

Grade A — 10Cr13Ni13

Grade B — 04Cr18Ni12

5.2 The above grades are modified austenitic chrome-nickel stainless steels having exceptionally low permeability even after heavy cold-drawing, high resistivity and good resistance to corrosion. They are austenitic up to the melting point and possess high strength after cold-working.

5.3 Grade A steel is used extensively as armature binding wire in rotors and generators because of very high tensile strength and high resistivity.

*Specification for non-magnetic stainless steels for electrical applications:

Part 2 Specific requirements

Part 3 Specific requirements for sheets, strips and plates

†Glossary of terms relating to iron and steel:

Part 3 Hot rolled steel products (excluding sheet and strip)

Part 4 Steel sheet and strip

Part 5 Bright steel bar and steel wire

‡General requirements for the supply of metallurgical materials (*first revision*).

5.3.1 Coating—The wires in Grade A shall be coated with a continuous layer of pure tin by hot-dipping technique. The thickness of tin coating shall be sufficient to ensure good soldering with 60Sn40Pb soldering alloy.

5.4 Grade B steel because of its excellent corrosion resisting property and high strength, coupled with extremely low magnetic character, is recommended for parts in electrical machines, that shall not disturb the magnetic field while providing enough strength for mechanical support, specially in corrosive atmosphere. This is particularly suitable for non-magnetic wedges, spacers and fingers in electrical machines.

5.4.1 Grade B steel shall be supplied in the form of hot-rolled plate and cold-rolled sheet and strip, in heat-treated or non-heat treated condition.

6. TESTS

6.1 The material shall satisfy the requirements of mechanical, electrical and magnetic properties, as specified in Part 2 and Part 3 of this standard.

7. RETEST

7.1 Should any one of the test pieces first selected fail to pass any of the tests specified in Part 2 and Part 3 of this standard two further samples shall be selected for testing in respect of each failure. Should the test pieces from both these additional samples pass the material represented by the test samples shall deemed to comply with the requirements of that particular test. Should the test pieces from either of these additional samples fail, the material represented by the test samples shall be considered as not having complied with this standard.

8. SAMPLING

8.1 Unless otherwise agreed to, the method of drawing representative samples and the criteria for conformity for round steel wires and flattened wires shall be as prescribed in Appendix B.

8.2 For sheets, strips and plates, sampling procedures shall be in accordance with 9 of IS : 6911-1972*.

9. FREEDOM FROM DEFECTS

9.1 The material shall be well and cleanly drawn/rolled to the dimension specified. The material shall be sound, free from splits, rough/jagged and imperfect edges and other harmful surface defects.

*Specification for stainless steel sheet, strip and plate.

9.1.1 All coils or spools of wires shall be level and layer wound, free from cross winding or waves and sharp bends or kinks that would interfere with continuous operation. The coil or spool shall be of one continuous length made from a single heat.

10. PACKING

10.1 The wires shall be made in coil or spool form, packed in suitable oil paper, or by any other packing material, as agreed to between the manufacturer and supplier, in order to protect the consignment against damage during transit or embracemental deterioration.

10.2 Plates and sheets shall be supplied in bundles. Strips shall be supplied in coil or cut lengths.

11. MARKING

11.1 Marking — Each coil or spool of wire or package or plates, sheets or coil of strips shall be legibly marked with the following information:

- a) Name of the manufacturer or trade-mark,
- b) Grade,
- c) Weight,
- d) Size,
- e) Lot and heat number, and
- f) Number and date of order.

11.1.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

A P P E N D I X A

(Clause 0.3)

INFORMATION TO BE GIVEN BY THE PURCHASER

A-1. BASIS FOR ORDER

A-1.1 While placing an order for the purchase of material covered by this standard, the purchaser should specify the following:

- a) Grade
- b) Weight
- c) Dimensional details
- d) Condition of delivery
- e) Finish
- f) Tests required
- g) Any special requirement
- h) Test report, if required.

A P P E N D I X B

(Clause 8.1)

SAMPLING AND CRITERIA FOR CONFORMITY

B-1. LOT

B-1.1 In any consignment, all the coils of wire of the same grade and diameter manufactured under essentially similar conditions of manufacture, shall be grouped together to constitute a lot.

B-1.1.1 Samples shall be taken from each lot and tested for conformity to the standard.

B-2. SAMPLING

B-2.1 The number of coils to be taken from a lot shall be according to col 1 and 2 of Table 1. These samples shall be taken at random by using random number tables (see IS : 4905-1968*).

*Methods for random sampling.

TABLE 1 SCALE OF SAMPLING AND PERMISSIBLE NUMBER OF DEFECTIVES

(Clause B-2.1)

NO. OF COILS IN A LOT	NO. OF COILS FOR MECHANICAL, PHYSICAL AND MAGNETIC REQUIREMENTS	PERMISSIBLE NO. OF DEFECTIVES	NO. OF TESTS FOR CHEMICAL REQUIREMENTS
(1)	(2)	(3)	(4)
Up to 25	8	0	2
26 to 50	13	1	3
51 to 150	20	2	5
151 to 300	32	3	8
301 and above	50	5	8

B-3. PREPARATION OF SAMPLES AND NUMBER OF TESTS

B-3.1 Test for Mechanical, Physical and Magnetic Requirements — From the coils selected according to col 1 and 2 of Table 1, adequate length of test piece shall be cut from each end and subjected to physical tests, namely, size, surface condition, tensile, bend, wrapping, resistivity, magnetic and coating tests. A test piece failing to meet any one of the requirements, shall be called a defective. If the number of defectives found is less than the number of permissible number of defectives specified in col 3 of Table 1, the lot shall be considered to have conformed to physical requirements, otherwise not.

B-3.2 Tests for Chemical Requirement — Unless otherwise agreed, the following procedure shall be followed for chemical requirements:

From those test pieces which have conformed to physical requirements, further test pieces shall be selected at random according to col 4 of Table 1. These samples shall be tested for all the chemical requirements. If a test piece fails to meet the respective chemical requirement, it shall be called a defective. The lot shall be considered to have conformed to the chemical requirements if all the individual test pieces tested for chemical requirements pass the test, otherwise not.

B-4. CRITERIA FOR CONFORMITY

B-4.1 A lot shall be considered to have conformed to the requirements of the specification if **B-3.1** and **B-3.2** are satisfied.

(Continued from page 2)

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²